ASSIGNMENT 7

Textbook Assignment: "Boilers," "Duct and Ventilation Systems," and "Air Conditioning and Refrigeration." Pages 12-38 through 14-26.

7-1. What person is the most important member of a boiler maintenance team?

1. The supervisor
2. The welder
3. The laboratory technician
4. The operator

7-2. Any unusual temperature change the operator cannot correct should be reported to what individual?

1. Plant supervisor
2. Watch chief
3. Relief operator
4. Maintenance supervisor

7-3. What is the main purpose for conducting preventive maintenance inspections?

1. To keep the equipment in good operating condition
2. To anticipate and prevent equipment breakdown
3. To repair broken equipment
4. To keep an accurate maintenance record of all equipment

7-4. Refer to table 12-4. What draft reading is recommended in an oil burner firebox?

1. 1.0 inch
2. 2.0 inches
3. 0.01 inch
4. 0.02 inch

7-5. When soot combines with moisture, what is the result?

1. Slag
2. Sulfur dioxide
3. Sulfuric acid
4. Hydrogen sulfide

7-6. When left untended, soot corrosion on boiler metals causes which of the following problems?

1. Extensive deterioration
2. High fuel cost
3. High operating cost
4. Dirty steam

7-7. Soot and other deposits left on boiler brickwork lower the melting point of which of the following components?

1. Boiler tubes
2. Headers
3. Refractories
4. Burners

7-8. Failure to keep boiler watersides clean can result in which of the following conditions?

1. Dirty steam
2. Overheating
3. Carry-over
4. Low temperature

7-9. What condition often signals the need for waterside and fireside cleaning?

1. Lowering of stack gas temperature
2. Lowering of steam temperature
3. Rise in stack gas temperature
4. Rise in steam temperature

7-10. When preparing to work on watersides, what must you do concerning tools and equipment?

1. Sparkproof the metal tools
2. Clean and wipe each tool dry
3. Inventory and tag the tools
4. Inventory the tools and prepare an in/out sheet

7-11. What special type of extension light, if any, is authorized inside a boiler?

1. Explosionproof
2. Dustproof
3. Watertight glove
4. None

7-12. When work on the watersides of a boiler is being performed, a person should be stationed outside the boiler for what sole purpose?

1. To act as tender only
2. To assist workers in the boiler only
3. To act as tender and to assist workers in the boiler
4. To perform first aid if necessary

7-13. What two methods can be used to boil out the watersides of a boiler?

1. Sodium metasilicate pentahydrate and trisodium silicate
2. Sodium pentahydrate and sulfuric acid
3. Sodium silicate and trisodium metasilicate pentahydrate
4. Sodium metasilicate pentahydrate and trisodium phosphate

7-14. In the wet lay-up method, you should add what chemical to the water?

1. Sodium sulfite
2. Sodium hydroxide
3. Sodium silicate
4. Sodium electrolyte

7-15. In the wet lay-up method, 0.03-0.06 pounds of sodium sulfite should be added per how many gallons of water?

1. 30
2. 50
3. 100
4. 1,000

7-16. At what interval should water in an idle boiler be sampled and analyzed?

1. Daily
2. Weekly
3. Monthly
4. Quarterly

7-17. In the dry lay-up method, a minimum of how many pounds of quicklime should be used as a drying agent per 100 boiler horsepower?

1. 5
2. 10
3. 20
4. 40

7-18. A high-pressure or high-velocity ductwork system has a fan that operates within what static-pressure range?

1. 1 inch to 5 inches WC
2. 2 inches to 6 inches WC
3. 3 inches to 7 inches WC
4. 4 inches to 8 inches WC

7-19. Duct velocities greater than how many feet per minute (fpm) are normally unwarranted?

1. 2,000
2. 3,000
3. 4,000
4. 6,000

7-20. In a low-velocity system, the duct velocity is normally less than how many feet per minute?

1. 2,000
2. 1,500
3. 1,000
4. 500

7-21. What type of duct system is no longer legal?

1. Fiber glass
2. Asbestos
3. Sheet metal
4. Aluminum

7-22. When possible, you should use what shape of duct system ?

1. Square
2. Rectangular
3. Round
4. Trapezoidal

7-23. What is/are the primary disadvantage(s) of a double-duct system?

1. Unstable air quantities
2. High air velocities only
3. Unstable duct pressures only
4. High air velocities and unstable duct pressures

7-24. The type of material used for duct lining and covering must have what characteristic?

1. It must be nonbacteriological
2. It must be noncombustible
3. It must be sound absorbent
4. It must be inflexible

7-25. The power required by the fan for delivering air at a given quantity increases rapidly according to what change, if any, in duct size?

1. An increase only
2. A decrease only
3. An increase or a decrease
4. None

7-26. Rectangular fiber-glass ducts 24 inches or less in diameter must be supported every how many feet?

1. 10
2. 8
3. 6
4. 4

7-27. What type of joint is used to absorb expansion and contraction in a duct system?

1. Accordion
2. Bellows
3. Shiplap
4. Fabric

7-28. When computing duct size, you should first perform what calculation?

1. Air pressure
2. Air volume
3. Air velocity
4. Air movement

7-29. You can gain efficiency by installing what type of elbow in a duct system?

1. Long, sweeping
2. Short, 90 degree
3. Unidirectional
4. S curve

7-30. Short, 90-degree elbows can be used effectively in which of the following locations within an air duct system?

1. Before registers only
2. Before diffusers only
3. Before grilles only
4. Before registers, diffusers, and grilles

7-31. When designing a duct system, you should use what publication as a source of technical information?

1. Mechanical Engineering Manual
2. Duct Design and Fabrication
3. Construction Engineering Handbook
4. ASHRAE Handbook of Fundamentals

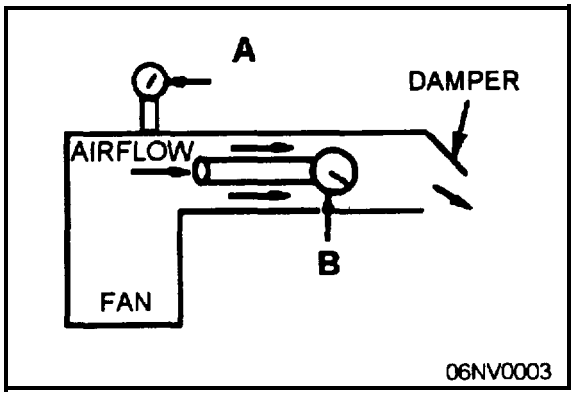

Figure 7A

IN ANSWERING QUESTIONS 7-32 AND 7-33, REFER TO FIGURE 7A.

7-32. The total pressure of the duct system is equal to the pressure reading of what gauge(s)?

1. A only
2. B only
3. B plus A
4. B minus A

7-33. The velocity pressure of the duct system is equal to the pressure reading of what gauge(s)?

1. A plus B
2. A only
3. A minus B
4. B minus A

7-34. A newly installed duct system is balanced in what manner?

1. By adjusting the speed of the fan
2. By drilling small holes in branch holes
3. By adjusting air outlets to the design rate of flow
4. By installing dampers in the main duct

7-35. What is the main purpose of pressure measurements after a newly installed system is balanced and operating properly?

1. To check the design of the system
2. To provide information for required reports
3. To provide information for future tests
4. To ensure proper adjustment of the fan and air outlets

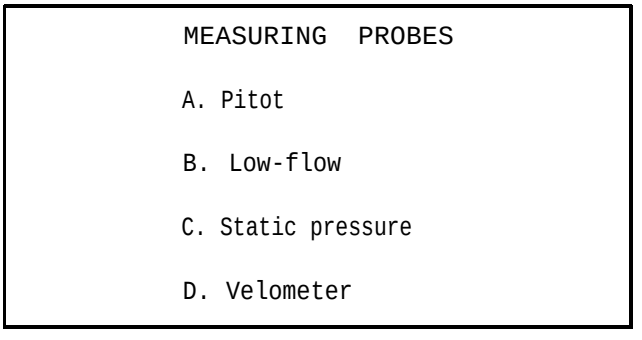

Figure 7B

IN ANSWERING QUESTIONS 7-36 THROUGH 7-38, REFER TO FIGURE 7B.

7-36. Measures air currents in open spaces:

1. A
2. B
3. C
4. D

7-37. Measures pressure drop across blowers in duct systems:

1. A
2. B
3. C
4. D

7-38. Measures internal air velocities in duct systems:

1. D
2. C
3. B
4. A

7-39. When used in conjunction with the diffuser probe, what device permits the rapid change of measuring ranges without shifting to separate jets for different velocities?

1. Manometer
2. Range selector
3. Tachometer
4. Anemometer

7-40. Which of the following is NOT a unit by which a manometer measures air pressure?

1. Pounds per square inch
2. Inches of mercury
3. Inches of water
4. Cubic feet per minute

7-41. One of the preliminary steps in air-balancing operations is to prepare a working sketch of the system. Which of the following items should be included in the sketch?

1. Duct dimensions
2. Air flow volumes and velocities
3. Air-delivery design of each outlet and type of diffuser
4. Each of the above

7-42. When balancing an air distribution system, you should first determine fan performance for which of the following reasons?

1. To pinpoint problems caused by blockages in the duct system
2. To ensure the fan is rotating correctly
3. To ensure that sufficient static pressure and air volume are being handled at the fan
4. To ascertain whether the air filters are clean

7-43. What factors influence the performance of a fan in a ventilation system?

1. Static pressure and rpm of the fan
2. Voltage and amperage of the fan motor
3. Total airflow in the ventilation system
4. Each of the above

7-44. What instruments are used to measure the static pressure of an operating fan?

1. Velometer and static-pressure probe
2. Rotating vane anemometer and low-flow probe
3. Velometer and Pitot tube
4. Manometer and diffuser probe

7-45. Which of the following air distribution problems in ducts can be located quickly by measuring static pressure?

1. Leakage
2. Blockage
3. Slippage
4. Each of the above

7-46. Velocity pressure readings should be taken to determine the total air volume of a fan from which, if any, of the following areas?

1. Fan suction
2. Fan distribution spaces
3. Downstream of the fan in an area with minimum turbulence
4. None of the above

7-47. Velocity pressure readings should be taken at what location inside a rectangular duct?

1. Along the perimeter at equal intervals
2. From the center of equally divided areas of the cross section
3. Along the horizontal center line at equal intervals
4. At any accessible location

7-48. When the average velocity pressure is 120 fpm and the cross-sectional measurements are 18 inches by 24 inches, what is the total airflow, in cfm, within the duct?

1. 120
2. 270
3. 320
4. 360

7-49. The measured total air flow, in cfm, should exceed the design cfm by approximately 10 percent for which of the following reasons?

1. To allow for slippage
2. To ensure maximum fan speed
3. To allow for leakage
4. Each of the above

7-50. At what location, in respect to the duct configuration, should the final balancing procedure be started?

1. Downstream of the main air return
2. In the immediate area of the fan discharge
3. At the last outlet on the farthest branch from the fan discharge
4. In the largest spaces served by the duct

7-51. During the final balancing procedure, an air outlet that should be discharging 90 cfm is found to be discharging 125 cfm. Which of the following actions should you take?

1. Leave the damper open and proceed to the next outlet
2. Adjust the damper until the output drops to 90 cfm
3. Decrease the fan speed
4. Restrict the flow of return air

7-52. What term is commonly used to identify fresh air leakage into a building or room?

1. Infiltration
2. Exfiltration
3. Ventilation
4. Defiltration

7-53. A minimum amount of how much fresh air is necessary to provide sufficient oxygen and to remove carbon dioxide for each person in a typical office space?

1. 8 cfm
2. 2 cfm
3. 6 cfm
4. 4 cfm

7-54. A total of how many changes of air per hour is required for a conditioned space in a residence during the heating season?

1. One
2. Two
3. Three
4. Four

7-55. A sleeping person gives off approximately how many Btu per hour of heat?

1. 50
2. 100
3. 150
4. 200

7-56. When installing a natural ventilation system, you should consider location and what other factor regarding ventilation openings?

1. Wind
2. Control
3. Humidity
4. Temperature

7-57. You should use mechanical ventilation equipment under which, if any, of the following circumstances?

1. The outside air is high in humidity
2. The outside air has a high ambient temperature
3. The outside air cannot be supplied continually by natural forces
4. None of the above

7-58. When areas to be air-conditioned are in close proximity to each other, you should use what type of air-conditioning system?

1. Chilled water only
2. Hot and chilled water
3. Forced air
4. Natural draft

7-59. What type of air-conditioning system is recommended for use in a hospital?

1. Chilled water only
2. Hot and chilled water
3. Forced air
4. Natural draft

7-60. In heat load calculations, what factor denotes heat leakage?

1. H
2. K
3. P
4. R

7-61. In heat load calculations, what factor denotes insulation values?

1. R
2. P
3. K
4. H

7-62. When working on an ammonia-absorption refrigeration system, you need what type of manifold gauges?

1. Brass
2. Copper
3. Steel
4. Bronze

7-63. An expendable evaporator system works within what temperature range?

1. 32°F to 0°F
2. 15°F to -5°F
3. 10°F to -10°F
4. -20°F to 60°F

7-64. When you want to preserve the freshness of fruits and vegetables, you should use what type of evaporator system?

1. Expendable
2. Eutectic
3. Spray
4. Thermoelectric

7-65. What type of refrigeration system has no moving parts?

1. Expendable
2. Eutectic
3. Spray
4. Thermoelectric

7-66. What maximum temperature can be maintained in a cascade refrigeration system?

1. - 50°F
2. -100°F
3. -150°F
4. -250°F

7-67. What maximum temperature can be attained in a three-stage compound system?

1. -80°F
2. -135°F
3. -150°F
4. -250°F

7-68. Refer to figure 14-22B. The pressure at P1 is 7 pounds, P2 is 4 pounds, and P3 is 21 pounds. The valve is in what position?

1. Equilibrium
2. Closed
3. Open
4. None of the above

7-69. An external equilizer line is required when what pressure drop exists across an evaporator coil?

1. 1 pound
2. 5 pounds
3. 3 pounds
4. 7 pounds

7-70. When adjusting a thermal expansion valve, you must make how many turns of the valve stem at each interval?

1. One
2. Two
3. Three
4. Four

7-71. Of the following considerations, which one is most important when you are mounting a condenser on a roof?

1. The roof load strength
2. The noise level
3. The availability of water
4. The availability of electricity

7-72. What types of metal are used in a bi-metal thermostat?

1. Tin and antimony
2. Tin and steel
3. Copper and steel
4. Brass and invar

7-73. What type of thermostat uses 115 volts?

1. Line voltage
2. Low voltage
3. Millivoltage
4. High voltage

7-74. What is the most commonly used metering device?

1. The AEX
2. The capillary tube
3. The TEV
4. The low-side float

7-75. The additional starting torque of a capacitor-start, induction-run motor over that of a split-phase motor is provided by a

1. run capacitor in parallel with the start winding
2. start capacitor in series with the run winding
3. run capacitor in parallel with the run winding
4. start capacitor in series with the start winding